

REMARKS

Claims 1, 2, and 4-20 and 23 and 24, are presently pending in the application. Claim 3 has been canceled and Claims 21-22 have been withdrawn from consideration as being directed to non-elected inventions. Reconsideration and allowance of all claims are respectfully requested in view of the following remarks.

The Examiner has rejected Claims 16-17 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) at the time the application was filed, had possession of the claimed invention. The Examiner states that “selective deposition” of a masking material is not disclosed in the specification.

The claims have been amended to clarify that the deposition of the masking material itself is not “selective”, but rather, the etching of the masking material after deposition, is “selective” (i.e., a mask pattern is etched). The amendment to the claims should obviate the Examiner’s rejection.

The Examiner has rejected Claims 1-20 and 23-24 under 35 U.S.C. §112, second paragraph as being indefinite. Further, Claims 11-20 have been rejected by the Examiner under 35 U.S.C. §112, second paragraph, as being indefinite.

Although the Applicant disagrees with the Examiner’s characterization of the word “predetermined”, in order to move the prosecution forward, the word “predetermined” has been deleted from the claims. Thus, the rejection under 35 U.S.C. §112, second paragraph, should be withdrawn.

Further, Claims 1 and 23 have been amended to more clearly define the present invention with respect to the fact that the second plurality of patterns are deposited without alignment with respect to the first plurality of patterns.

The Examiner has rejected Claims 1, 2, 4, 7, 11-20, and 23-24 under 35 U.S.C. §103 as being unpatentable over Pribat et al. The Examiner has rejected Claims 1, 2, 4, 7, 11-15, and 23-24, under 35 U.S.C. §103 as being unpatentable over Tsuda et al. Finally, the Examiner has rejected Claims 1, 4-6,

and 8-10 under 35 U.S.C. §103 as being unpatentable over Pribat et al. or Tsuda et al. in view of Fleming et al. For the following reasons, the prior art rejections are respectfully traversed.

The Applicant respectfully submits that Pribat et al. do not teach or suggest a method of manufacturing a crystal of III-V compound of a nitride system, including the steps of forming a first plurality of patterns of at least one pitch, in one position in a direction of a thickness of the crystal, and; forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal without alignment with respect to said first plurality of patterns; wherein the second plurality of patterns at least partly overlies said first plurality of patterns in the direction of the thickness of the crystal and at least partly does not overlie said first plurality of patterns in the direction of the thickness of the crystal: wherein said one of at least one pitch of pattern elements of said first plurality of patterns and said at least one pitch of pattern elements of said second plurality of patterns are different from each other, as recited in Claims 1 and 23.

Rather, the Examiner has not met his burden of proving a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Further, there must be a reasonable expectation of success, and finally, the prior art reference must teach or suggest all the claim limitations.

As the Examiner admits, Pribat et al. fail to disclose that a second plurality of patterns which partly overlie, at a second pitch, a first plurality of patterns at a first pitch, in the direction of the thickness of the crystal, where the first pitch and second pitch are different from one another.

Although the Examiner alleges that this feature is obvious given Pribat et al., the Applicant respectfully traverses.

Pribat et al. disclose depositing insulator strips 20, 21, 22 separated by bands 23, 24, having a width of 20 to 100 micrometers, for example, separated by spaces of 1 to 20 micrometers. There is no

disclosure or suggestion in Pribat et al. of any importance to the particular spacing between the strips 20, 21, 22, and the bands 23, 24 could be at any spacing each, or at the same spacing for all bands.

Further, in Pribat et al., monocrystalline silicon is deposited in the bands 23, 24, and a mechanism of selective nucleation grows silicon on the surfaces of the insulator bands 20, 21, 22. A layer of insulator 4 is deposited on the structure obtained, and then apertures 43, 44, 45 are made over the zones of polycrystalline material 30, 31, 32. The apertures 43, 44, 45 are made in the form of bands with a width substantially smaller (i.e., 1-20 micrometers) than the width of the insulator bands 20, 21, 22 (i.e., 20-100 micrometers). However, again, there is no disclosure or suggestion in Pribat et al. that the apertures 43, 44, 45 should be of a particular width each, or all together.

Further, Pribat et al. fail to disclose or suggest that the widths of the bands 23, 24 are either the same or different from that of the apertures 43, 44, 45, or that there is any merit in making them the same or different. In fact, Pribat et al. shows in the drawings that the two sets of apertures (i.e., 23, 24 and 43, 44, 45) are substantially of the same width.

Further, there is no suggestion in Pribat et al. that the variance of the pitch of apertures 23, 24, from that of apertures 43, 44, 45 would lead to preventing dislocations from reaching the surface of the crystal substrate (see page 10, lines 16-21, of the present specification).

In fact, in Pribat et al., the polycrystalline silicon 30, 31, 32 is removed by chemical attack using the apertures 43, 44, 45, and then a strip of monocrystalline silicon is made to grow laterally under conditions of selective epitaxy, and then oxidized such that the lower faces of oxidized silicon in the bands 43, 44 and 45 are flush with the lower faces of the layers 40, 41, 42, to obtain a face 46, which is substantially continuous and planar.

Thus, the layers 40, 41, 42 are not laid down without alignment with that of the bands 20, 21, 22, since in fact, the object of the apertures 43, 44, 45 being disposed where they are, is to provide access to the bands 20, 21, 22 and thus to grow the monocrystalline silicon thereon (see FIGS. 7-9 of Pribat et al.).

Further, with the removal of the layers 40, 41, 42, and formation of continuous and planar face 46, there is no second plurality of patterns 43, 44, 45 to prevent the dislocations from reaching the surface of the crystal substrate (see page 10, lines 16-21, of the present specification). This is because Pribat et al. is concerned with a different problem than that of the present invention - that of achieving three-dimensional integration of active electronic components by enabling the making of a monocrystalline semiconductor substrate, of a stacking of thin layers of monocrystalline semiconductors, each layer being insulated from the previous layer by a layer of insulator.

However, one object of the present invention is concerned with preventing dislocations from reaching the surface of the crystal substrate, and the use of partly overlying stripes in the first and second mask patterns, the patterns being at different pitches to achieve this overlying, reaches this goal.

Accordingly, since there is no suggestion or motivation in Pribat et al. to achieve the claimed features of the present invention, nor is there any suggestion of success of achieving such a goal, then Claims 1 and 23 of the present invention is not obvious over Pribat et al., and the rejection of Claims 1 and 23 under 35 U.S.C. §103 over Pribat et al., should be withdrawn.

Further, since Claims 2, 4, 7, and 11-20, depend from Claim 1, and Claim 24 depends from Claim 23, they are also patentably distinguishable over Pribat et al. for the reasons cited above with respect to Claims 1 and 23.

With respect to Tsuda et al., the Applicant respectfully submits that Tsuda et al. do not teach or suggest a method of manufacturing a crystal of III-V compound of a nitride system, including the steps of forming a first plurality of patterns of at least one pitch, in one position in a direction of a thickness of the crystal, and; forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal without alignment with respect to said first plurality of patterns; wherein the second plurality of patterns at least partly overlies said first plurality of patterns in the direction of the thickness of the crystal and at least partly does not overlie said first plurality of patterns in

the direction of the thickness of the crystal; wherein said one of at least one pitch of pattern elements of said first plurality of patterns and said at least one pitch of pattern elements of said second plurality of patterns are different from each other, as recited in Claims 1 and 23.

Rather, Tsuda et al. disclose a first patterned mask and a second patterned mask, both of which have periodic stripes disposed at a same pitch (i.e., 10 μm), and which are laid down with predetermination with respect to the alignment of the second mask with respect to the first mask. In fact, depending on how the second mask is laid down, it does not partly overlie the first mask as required by Claims 1 and 23 of the present invention.

Although Tsuda et al. teach that the width of the second mask being larger than that of each opening in the first mask is important to decrease the defect density, Tsuda et al. disclose that by making the stripe width of the second mask smaller than each opening in the first mask can provide certain positive benefits. In particular, Tsuda et al. disclose that the width of the second mask can be prescribed to be smaller than each opening of the first mask to provide high priority to uniformity of characteristics and yield (see Tsuda et al., col. 8, lines 13-19, 29-34, 38-41, 44-47, and 61-64). In this case, the second mask would not overlie the first mask, as required by Claims 1 and 23 of the present invention, and the second mask would have to be laid down, with the same pitch, with a predetermined alignment with respect to the first mask.

Accordingly, Tsuda et al. do not provide the motivation or suggestion to partly overlie the second mask on the first mask, without alignment with respect to the first mask, but only by varying the pitch of the two masks, to thereby prevent dislocations from reaching the surface of the crystal substrate, as substantially recited in Claims 1 and 23.

Rather, Tsuda et al. take a different approach to the improvement of the manufacturing of a semiconductor substrate.

Therefore, Claims 1 and 23 are not obvious over Tsuda et al., and the rejection of Claims 1 and 23 under 35 U.S.C. §103 over Tsuda et al. should be withdrawn.

Further, since Claims 2, 4, 7, and 11-15, depend from Claim 1, and Claim 24 depends from Claim 23, they are also patentably distinguishable over Tsuda et al. for the reasons cited above with respect to Claims 1 and 23.

The addition of the Fleming et al. reference does not make up for the deficiencies in Pribat et al. or Tsuda et al.

Rather, all Fleming et al. discloses is that a structured layer need not be rectangular bars arranged parallel to each other, but can take on different shapes, sizes, and orientations. However, this general statement does not provide the motivation to combine with Pribat et al. or Tsuda et al., to arrange a second plurality of patterns at a certain pitch to overlie a first plurality of patterns which are at a different pitch, and to lay that second plurality of patterns without alignment to the first plurality of patterns, for the reason of preventing dislocations from reaching the surface of the crystal substrate. Fleming et al. are silent with respect to anything other than suggesting that a physical rearrangement of layers (not patterns) is possible.

Accordingly, Claim 1 is not obvious over either Pribat et al., or Tsuda et al., either alone or in combination with Fleming et al., and the rejection of Claim 1 under 35 U.S.C. §103 should be withdrawn.

With respect to Claim 4, the Applicant respectfully submits that neither Pribat et al. nor Tsuda et al., either alone or in combination with Fleming et al., teaches or suggests a relationship between the pitch of the pattern elements of one of the first plurality of patterns and the pitch of the pattern elements of one of the second plurality of patterns is:

$$0.1 \mu\text{m} < p_1 \times p_2 / |p_2 - p_1| < 5000 \mu\text{m}$$

where p_1 denotes the pitch of the pattern elements of one of the first plurality of patterns and p_2 denotes the pitch of the pattern elements of one of the second plurality of patterns.

Rather, since Pribat et al. and Tsuda et al. are silent with respect to the feature of providing first and second plurality of patterns with different pitches, and Fleming et al. do not disclose the reason for varying the pitch other than that structural arrangements can be varied, they can not disclose or suggest the relationship of Claim 4.

However, in the present invention, the cited relationship was found, with the conditions described, to provide no dislocations which reach the crystal surface (see page 14 of the present specification).

Accordingly, Claim 4 is not obvious over either Pribat et al. or Tsuda et al., and the rejection of Claim 4 under 35 U.S.C. §103 should be withdrawn.

With respect to Claims 5 and 6, the Applicant respectfully submits that the addition of the Fleming et al. reference does not make up for the deficiencies in Pribat et al. and Tsuda et al.

As previously discussed, Pribat et al. and Tsuda et al. are silent with respect to the pattern elements of the first and second plurality of patterns having different pitches, and the pattern elements are arranged in different intervals and of different lengths. Although Fleming et al. discloses layers, not pattern elements, being arranged in different structural arrangements, there is no motivation to combine Fleming et al. with either Pribat et al. and Tsuda et al. to achieve the claimed features of the present invention. In the present invention, varying the pitches, and arranging the pattern elements at different intervals and of different lengths prevents dislocations from reaching the surface of the crystal substrate. This motivation is lacking in Fleming et al., so there is no reason to combine Fleming et al. with Pribat et al. and Tsuda et al. to achieve the claimed features of the present invention.

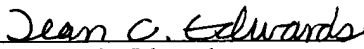
Accordingly, Claims 5 and 6 are not obvious over either the individual or the combination of the Pribat et al., Tsuda et al. and Fleming et al. references, and the rejection of Claims 5 and 6 under 35 U.S.C. §103 should be withdrawn.

Further, since Claims 4-6 and 8-10 depend from Claim 1, they are also patentably distinguishable over Pribat et al., Tsuda et al. and Fleming et al., for the reasons cited above with respect to Claim 1.

If the Examiner believes that there is any issue which could be resolved by a telephone or personal interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 19-3140.

Respectfully submitted,


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